Spot Safety Project Evaluation

Project Log # 200812057

Spot Safety Project # 12-99-008

Spot Safety Project Evaluation of the Installation of an Actuated Traffic Signal At the Intersection of SR 1502 (28th St NE) and SR 1400 (Kool Park Rd) Catawba County

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Transportation Mobility and Safety Division
North Carolina Department of Transportation

Principal Investigator

Brad Robinson

Brad Robinson, PE

5/12/2009
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 12-99-008 – The Intersection of SR 1502 (28th St NE) and SR 1400 (Kool Park Rd) in Hickory, Catawba County.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of an actuated traffic signal.

The signal ID is 12-1012 for the subject location.

The subject location is a three-leg intersection which was controlled by a stop sign on SR 1502 (28th St NE) in the before period. SR 1400 (Kool Park Rd) is a two-lane facility at the subject location with a left-turn lane for the eastbound direction at the intersection. SR 1502 has both a right turn lane and a left turn lane at the subject intersection. The speed limits are 45 mph for SR 1400 and 35 mph for SR 1502.

The only background information in the project file folder was a letter from a private citizen requesting a signal at the intersection. According to the letter, SR 1502 (28th St NE) is used by students, parents, teachers, and school buses as an access road for a high school, a middle school, and several elementary schools. It said that during the morning and afternoon rush hours there was a constant stream of traffic on SR 1400 (Kool Park Rd) which made it very difficult to turn onto it from SR 1502.

The initial crash analysis was conducted from January 1, 1995 to December 31, 1998 with a total of four reported crashes, three of which were considered correctable by the chosen countermeasure. The final completion date for the improvements at the subject intersection was on January 22, 2003 with a total cost of $40,000.00.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from December 1, 2002 to March 31, 2003. The before period consisted of reported crashes from April 1, 1997 through November 30, 2002 (5 years and 8 months) and the after period consisted of reported crashes from April 1, 2003 through November 30, 2008 (5 years and 8 months). The ending date for this analysis was limited by the available crash data at the time the analysis was conducted.

The treatment data consisted of all reported crashes within 150 feet of the subject intersection.

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Frontal Impact crash types were the Target Crashes for the applied countermeasure. These crash types considered are as follows: Left Turn, same roadway; Left Turn, different roadway; Right Turn, same roadway; Right Turn, different roadway; Head On and Angle. The target crashes are clearly identified in the before and after period collision diagrams.

Treatment Information			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Total Crashes	2	4	100.0
Total Severity Index	4.7	4.7	0.0
Target Crashes	0	2	N/A
Target Crash Severity Index	N/A	4.7	N/A
Volume	8,500	9,700	14.1
Crash Severity Summary			
Fatal Crashes	0	0	N/A
Class A Crashes	0	0	N/A
Class B Crashes	0	0	N/A
Class C Crashes	1	2	100.0
PDO Crashes	1	2	100.0

The naive before and after analysis at the treatment location resulted in a 100 percent increase in Total Crashes and an increase in Target Crashes from zero in the before period to two in the after period. There was a 14 percent increase in Average Daily Traffic (ADT). The before period ADT year was 2000 and the after period ADT year was 2006.

Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 100 percent increase in Total Crashes and an increase in Target Crashes from zero in the before period to two in the after period. The Total Severity Index remained constant from the before period to the after period. The summary results above demonstrate that both Total Crashes and Target Crashes appear to have increased at the treatment location from the before to the after period.

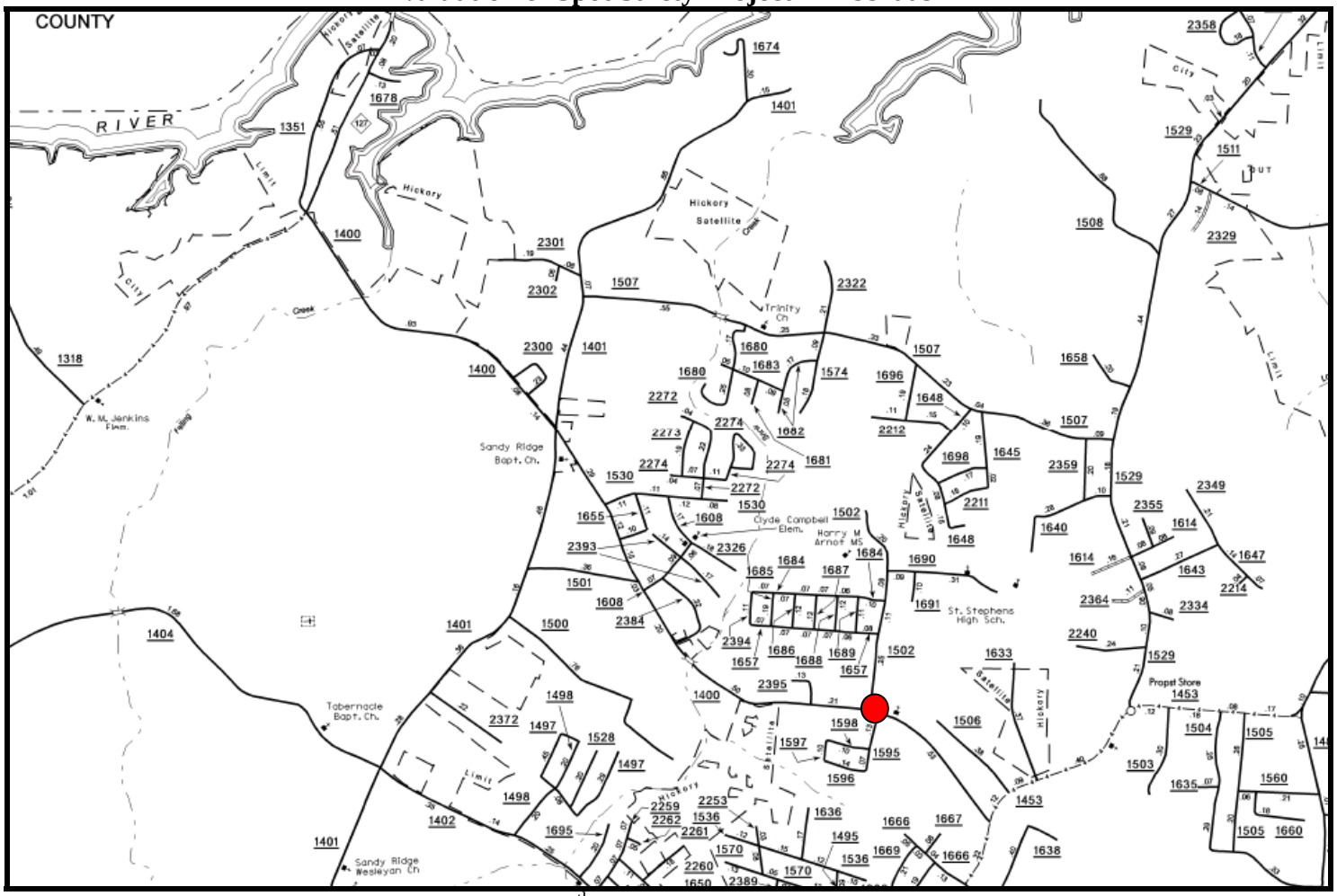
The calculated benefit to cost ratio for this project is -0.48 considering total crashes. The benefit to cost ratio considering only target crashes is also -0.48. The benefits are calculated using the change in annual crash costs from the before to the after period. Operational and other benefits related to the project are not considered in this analysis. The costs of the project include the actual construction costs as well as the increase in annual maintenance and utility costs.

The two Target Crashes in the after period included a Left Turn-Same Roadway Crash and a Left Turn-Different Roadway Crash. The Left-Turn Different Roadway Crash involved a vehicle on SR 1400 running a red light.

After reviewing the before period crashes at the intersection and reading the letter in the project folder, it appears that the project was installed more to ease the congestion at the intersection than as a safety countermeasure. The naïve before and after analysis can not measure the effectiveness in this area.

As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of intersection.

Location Map
Catawba County
Evaluation of Spot Safety Project #12-99-008A



Treatment Location: SR 1502 (28th St NE) and SR 1400 (Kool Park Rd) in Hickory

Looking East on SR 1400 (Kool Park Rd)

Looking West on SR 1400 (Kool Park Rd)

Looking South on SR 1502 (28th St NE)

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 1502 and SR 1400 BY: BDR
COUNTY: Catawba DATE: 4/6/2009
FILE NO.: SS 12-99-008

DETAILED COST: TYPE IMPROVEMENT - Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$0	0	0.000	$0
	$40,000	10	0.149	$5,961
Right-of-Way	$0	0	0.000	$0
TOTALS	$40,000	10	0.149	$5,961

ESTIMATED INCREASE IN ANNUAL MAINT. COST = $2,000
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $900

TOTAL ANNUAL COST= $8,861
TOTAL COST OF PROJECT= $40,000

COMPREHENSIVE COST REDUCTION:

		ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES						
TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	5.67	0	0.00	1	0.18	1	0.18	$4,268
AFTER	5.67	0	0.00	2	0.35	2	0.35	$8,536

Annual Benefits from Crash Cost Savings ($4,268)

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = ($13,129)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = -0.48

TOTAL COST OF PROJECT - $40,000 COMPREHENSIVE B/C RATIO - -0.48

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 1502 and SR 1400 BY: BDR

COUNTY: Catawba DATE: 4/6/2009

FILE NO.: SS 12-99-008 Target Crashes

DETAILED COST: TYPE IMPROVEMENT - Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$0	0	0.000	$0
	$40,000	10	0.149	$5,961
Right-of-Way	$0	0	0.000	$0
TOTALS	$40,000	10	0.149	$5,961

ESTIMATED INCREASE IN ANNUAL MAINT. COST = $2,000

ESTIMATED INCREASE IN ANNUAL UTILITY COST = $900

TOTAL ANNUAL COST= $8,861

TOTAL COST OF PROJECT= $40,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	5.67	0	0.00	0	0.00	0	0.00	$0
AFTER	5.67	0	0.00	1	0.18	1	0.18	$4,268

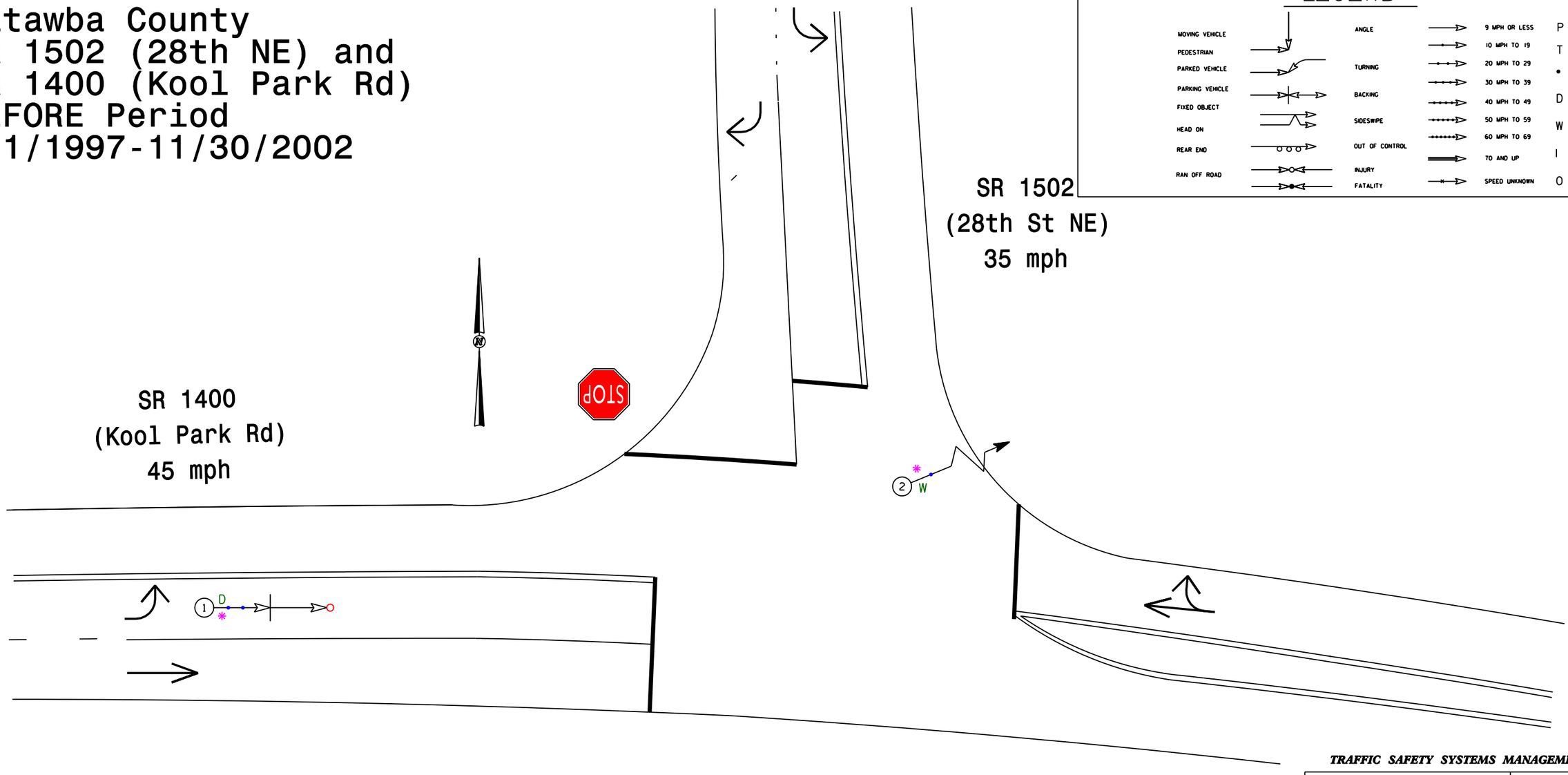
Annual Benefits from Crash Cost Savings ($4,268)

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = ($13,129)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = -0.48

TOTAL COST OF PROJECT - $40,000 COMPREHENSIVE B/C RATIO - -0.48

Catawba County
SR 1502 (28th NE) and
SR 1400 (Kool Park Rd)
BEFORE Period
4/1/1997-11/30/2002

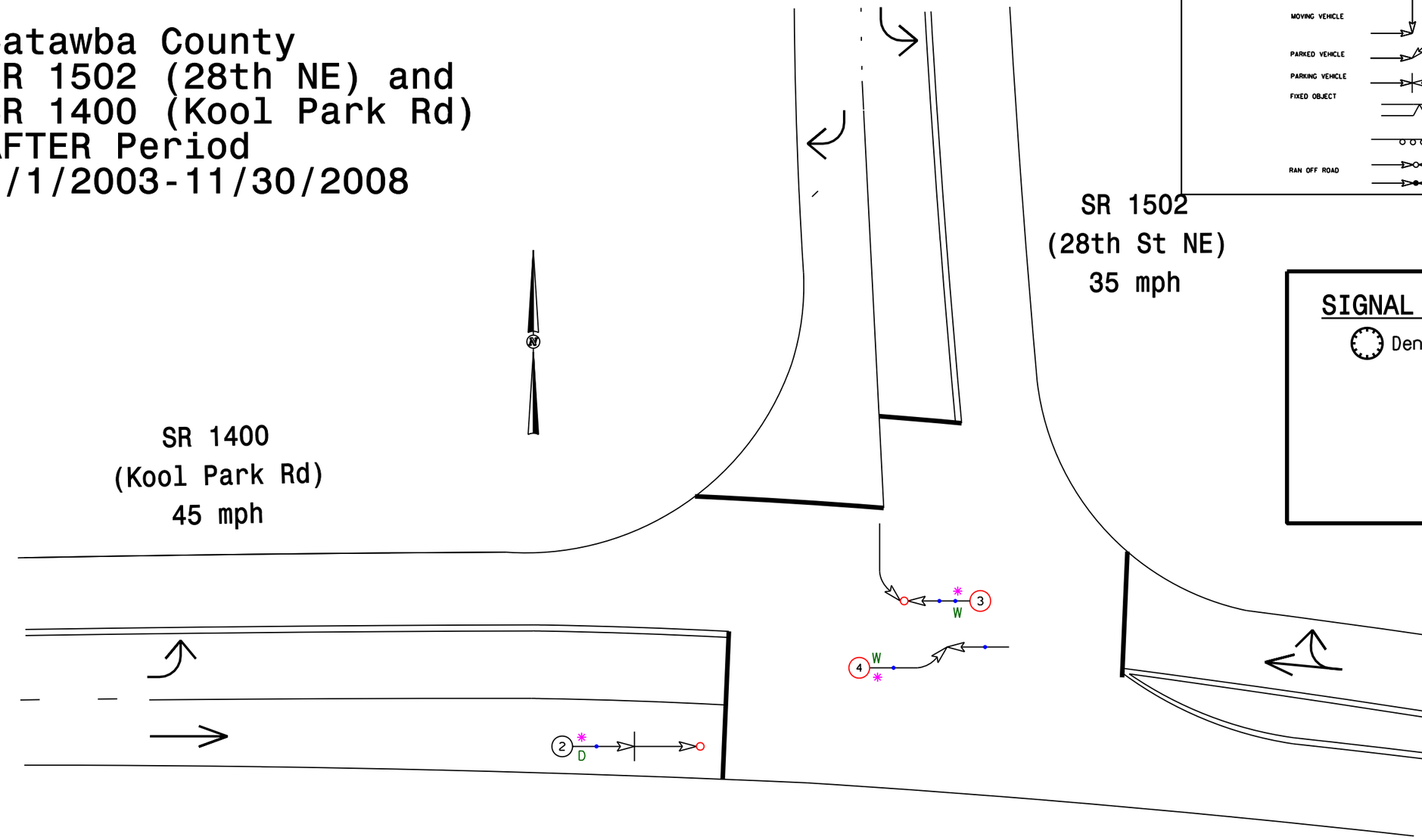


TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM	
DIVISION: 12	AREA:
STUDY PERIOD: 4/1/1997-11/30/2002	
DISTANCE: Y-LINE = 150FT	
ANALYSIS PREPARED BY: BDR	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: BDR	
DIAGRAM REVIEWED BY:	
SCALE: NOT TO SCALE	
DATE: March 2009	
LOG NUMBER: 20082057	

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRANSPORTATION MOBILITY AND SAFETY DIVISION

Catawba County
SR 1502 (28th NE) and
SR 1400 (Kool Park Rd)
AFTER Period
4/1/2003-11/30/2008



LEGEND

MOVING VEHICLE
PARKED VEHICLE
PARKING VEHICLE
FIXED OBJECT
RAN OFF ROAD

ANGLE
TURNING
BACKING
SIDESWIPE
OUT OF CONTROL
INJURY
FATALITY

9 MPH OR LESS
10 MPH TO 19
20 MPH TO 29
30 MPH TO 39
40 MPH TO 49
50 MPH TO 59
60 MPH TO 69
70 AND UP
SPEED UNKNOWN

P PEDESTRIAN
T TRAIN
• DRIVER AT FAULT
D DRY
W WET
I ICY OR SNOWY
O OILY

SIGNAL FACE I.D.

Denotes L.E.D.

R
Y 12"
G

(#) Target Crash

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

HIGHWAY SAFETY PLANNING AND ANALYSIS
HIGHWAY SAFETY IMPROVEMENT PROGRAM
HIGHWAY SAFETY MANAGEMENT
RAILROAD-HIGHWAY SAFETY MANAGEMENT

COLLISION DIAGRAM	
DIVISION: 12	AREA:
STUDY PERIOD: 4/1/2003-11/30/2008	
DISTANCE: Y-LINE = 150FT	
ANALYSIS PREPARED BY: BDR	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: BDR	
DIAGRAM REVIEWED BY:	
SCALE: NOT TO SCALE	
DATE: March 2009	
LOG NUMBER: 20082057	

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRANSPORTATION MOBILITY AND SAFETY DIVISION